



Efficiency. Control. Choice.

CLOUD COMPUTING AND THE ECONOMICS OF ENTERPRISE IT

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What You Will Learn

Private cloud computing can significantly reduce enterprise IT costs by improving the efficiency of data center resources. This document identifies specific cost savings an enterprise can achieve as it moves from a traditional data center architecture to a private cloud computing environment delivered by preintegrated packages of virtualized server, storage, and network systems.

Note that all references to cloud computing in this document refer to private cloud computing, unless otherwise noted.

Overview

Enterprise IT departments need to respond with agility to business needs and demand fluctuations, which existing data center architectures cannot achieve. Private cloud computing—highly scalable IT resources abstracted from an underlying infrastructure and provided as needed in a multi-tenant environment—has emerged as a prime vehicle for creating agile IT environments.

Private cloud computing is not a solution for every organization, but close examination reveals that many businesses and even some industries are well placed to achieve its benefits: those spending a high proportion of their technology budgets on infrastructure and running applications on x86 platforms. Other leading indicators that affect the attractiveness of private cloud computing for a given business include workload predictability, security constraints, and licensing requirements.

Built on standardized and integrated infrastructure packages connected by a single unified fabric, private cloud computing can save enterprises significant money by pooling and sharing resources, decoupling applications from platforms with server virtualization, offering pay-per-use pricing, virtualizing storage, reducing total storage needs, enabling migration of data and workloads, implementing single-pane management, and streamlining support.

There is no one-size-fits-all way to achieve the greatest benefits from private cloud computing, but carefully developed roadmaps and implementation plans will take you a long way toward gaining the rewards.

Today's Data Center

During the past 10 years, outsourcing, offshoring, consolidation, and increasing use of server virtualization have helped to significantly reduce IT costs. However, IT still needs to improve responsiveness to the changing needs of the business as it responds to market conditions. Current data center architectures lack the requisite flexibility in several areas:

- The technology infrastructure is complex, heterogeneous, and difficult to modify. Commonly, most of an IT department's budget is allocated to the maintenance and support of in-production resources, leaving inadequate funding for innovations that could significantly increase value to the business.
- Resource overprovisioning continues to be a problem. Despite the growing adoption of virtualization, meeting service-level agreements (SLAs) requires an infrastructure designed to accommodate near-peak demand scenarios on a continuous basis, often resulting in server, storage, or network overprovisioning. Conversely, there is essentially no ability to decrease resource allocation when utilization falls below projections. This environment drives up capital equipment outlays.
- Deployment of new systems is too costly. Significant time and money is expended configuring, provisioning, and implementing new systems, with each implementation tending to establish a new island of functions outside any common set of infrastructure capabilities.

Organizations are left with high IT administrative costs and capital outlays for systems designed to be substantially underutilized: a recipe for consistently poor return on investment (ROI).

The Impending Imperative: Cloud Computing

Overcoming these challenges requires a new generation of data centers that use the architectural approach of cloud computing to deliver lower cost structures for compute, storage, and network capabilities.

Cloud computing is coming to enterprises one way or another. In much the same way that “shadow IT” resulted in unsupported servers or workstations hiding under an employee’s desk in the past, it can resurface as leased storage and compute capacities from public cloud providers today.

Faced with competition from external providers delivering services that are at least perceived as being easier to use, enterprise IT departments must find ways to implement this new architecture, which offers greater flexible and lower cost. The Virtual Computing Environment (VCE) coalition has been established to provide the integrated platforms and services to help enterprises move to cloud computing.

Did You Know?

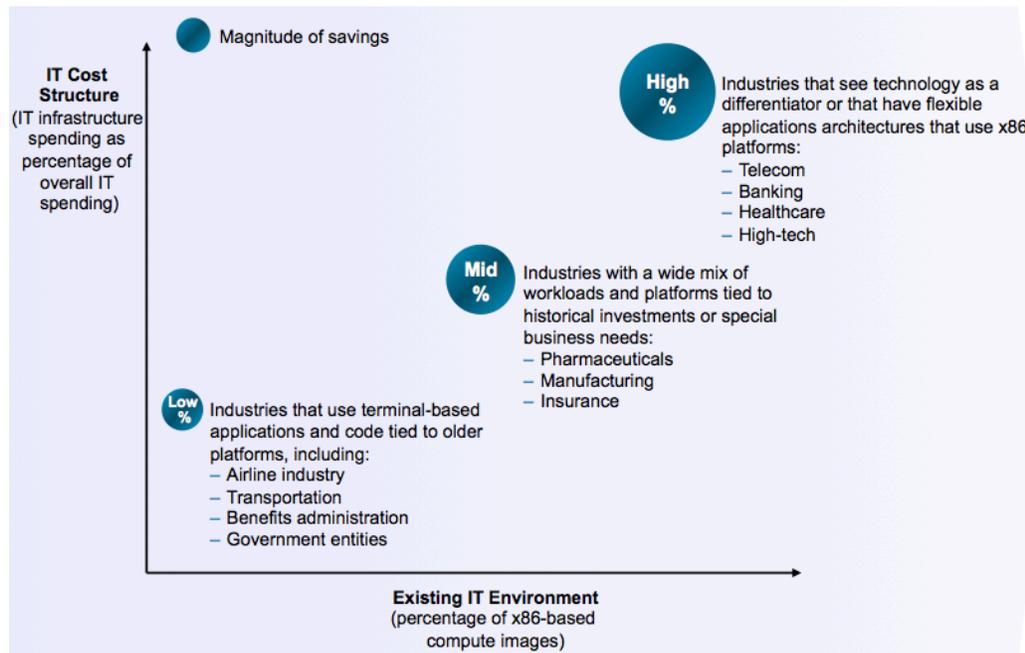
“There is US\$500 billion worth of IT equipment purchased over the past five years...optimized for legacy client-server workloads... (It) will not be adequate to support the next-generation cloud computing, virtualization and mobility workloads of the future...”

– Pacific Crest, March 2010

Does Private Cloud Computing Fit Your Business or Industry?

The benefits of implementing private cloud computing vary with the nature of the underlying enterprise. Figure 1 shows two main factors that determine savings potential: the proportion of typical IT budget spending on infrastructure and the proportion of applications running on x86 platforms. The higher each proportion, the more a business or industry can gain from private cloud computing.

Figure 1 Private Cloud Computing Savings Vary Across Industries



The Virtual Computing Environment Coalition

Cisco, EMC, and VMware have created the Virtual Computing Environment coalition to help companies move from a physical to a virtual environment to increase business value.

The coalition offers integrated, tested, and validated infrastructure packages that combine best-in-class virtualization, network, compute, storage, security, and management technologies from Cisco, EMC, and VMware.



In addition, the following four technology-related factors significantly influence the potential economic benefits of private cloud computing:

- Application platform
 - The greatest benefit comes from moving applications currently running on non-virtualized x86 physical platforms onto integrated (network, computer, storage, etc.) and virtualized x86 platforms designed for cloud computing.
 - A lesser benefit can come from moving applications currently running on a virtualized x86 platform onto an integrated and virtualized x86 platform. This solution lowers costs by improving administration for a variety of management tasks, including workload balancing across systems.
- Workload predictability
 - Private cloud computing is a good match for workloads that are latency tolerant, such as Domain Name Service (DNS), print servers, and virtual desktops. Conversely, workloads that require low-latency or schedule-based sharing of resources are less well suited.
 - Workloads that have well-documented demand patterns are easier to schedule resources for and lend themselves to cloud computing. Workloads with unpredictable demand peaks are more challenging, and resources tend to be underutilized during lower-demand periods.
 - Consistent and well-defined application APIs help speed deployment and facilitate workload migration to cloud computing as well as improve platform utilization.
- Security constraints
 - Private cloud computing must support IT security, regulatory, and audit requirements. Extensive and complex security constraints may limit the capability to move virtualized server and storage images between data centers or to a public cloud provider.
- Licensing requirements
 - Independent software vendor (ISV) software licensing policies for virtualized platforms vary by vendor and can hamper savings. New management tools can help identify the minimum number of licenses needed across the enterprise cloud, based on the software and platform used.
 - Enterprise IT and ISVs must agree on a common tool set for measuring license use within a cloud. Current chargeback models are often based on hardware-specific licenses, whereas in cloud environments, applications are deployed on virtual machines. Without some agreement on metrics, pay-per-use pricing will be challenging to implement.

As organizations move toward pay-per-use pricing, most business units will likely see their costs drop because of the forecasted decrease in overall IT expenditures. However, some business units may experience level or increased costs because of platform, workload, security, and licensing differences.



How Private Cloud Computing Saves Money

The VCE coalition has identified some significant ways that private cloud computing saves enterprise IT departments money.

Resource Pooling and Sharing

Through pervasive virtualization across servers, storage, and networks, system resources can be managed as configurable pools of resources instead of as islands of independent infrastructure. These resource pools can then be exposed in a granular manner for use by business applications. Fluctuations in the resource requirements of each application are averaged, allowing the use of fewer underlying technology resources.

The economic benefits here are profound. The risks of overprovisioning (that is, capital outlays in excess of demand, resulting in system underutilization) and underprovisioning (that is, inadequate capital outlays, resulting in unavailable systems and dissatisfied users) are reduced. Specifically:

- Capital expenses decline as higher utilization rates lead to fewer purchases of physical server, storage, and network devices.
- Operating costs decline because reduction in the number of data center devices and data centers leads to lower support costs, including decreased power, cooling, and space expenses.

Pervasive virtualization also provides a significant “green” benefit:

- Smaller data center footprints and energy consumption lower CO₂ emissions.

Decoupling of Applications from Platforms

The same virtualization that enables resources to be pooled and shared also enables greater utilization by decoupling applications from the infrastructure. Applications can be run on different resources, within and across data centers, and be moved from one location to another. The capability to dynamically shift virtualized workloads to underutilized or more cost-effective resources improves efficiency and utilization while also lowering costs.

Pay per Use

Cloud computing is not the first model to employ consumption-based payment mechanisms. For example, network bandwidth carriers have been charging based on use for years. However, allocation of charges for actual resources used in real time is a core capability of cloud computing.

Prior to private cloud computing, business units had to pay an estimated allocation of an overprovisioned IT environment. In this model, some users pay for more than they use, and others for less, because actual use rarely equals the accounting allocation. With private cloud computing, business units pay based on their actual, measured use. This pay-per-use cost structure is augmented by the lower overall IT cost structure discussed earlier.

Storage Virtualization

By virtualizing storage, private cloud computing allows the physical location of data to be abstracted from the underlying platform, making data vastly easier to migrate. Data can be housed on the platform that best meets particular cost or security criteria at a given point in time or according to a given policy.

Real Business Value

“From both a business and IT perspective, the results are significant and highly compelling, clearly showing how a private cloud environment could help us better manage our SAP landscape and contain costs at the same time...We also saw how we could achieve greater agility in our business applications to rapidly meet our internal customer business needs. And all of this was achievable through better utilization of our infrastructure assets, without sacrificing performance, security or availability...”
– Tom Peck, SVP and CIO, Levi Strauss & Co.,



Reduced Data Storage

Storage virtualization also adds operating benefits that enable total data storage to be reduced:

- A more consistent view of stored data makes utilization optimization methods, such as data deduplication and thin provisioning, easier to implement.
- Administrators can more quickly and confidently identify data that can be stored outside the corporate firewall, thus reducing storage costs.
- Users can be offered faster access to a wider range of information.
- Organizations can more easily enforce data security policies.

Workload and Data Migration

Implementing a common set of standardized, integrated system packages within a data center and across geographically distributed data centers makes workload migration and disaster recovery affordable options for more applications and data.

Single-Pane Management

Use of a single-pane management view gives IT administrators a consistent and common interface for each step in a technology lifecycle: configuration, provisioning, compliance, management, and monitoring across platforms. These management tools let administrators set up and run automated utilization monitoring and workload-balancing policies. They also enable a smaller number of administrators to manage a larger pool of resources, lowering staff costs while enhancing resource utilization.

Support

Implementing standardized, integrated infrastructure speeds fault isolation, streamlines staff training, and reduces the number of system configurations needing support.

Standardized Infrastructure Packages

Building private cloud computing infrastructures from preconfigured, preintegrated, and validated configurations of server, storage, and network equipment saves time and money by:

- Alleviating the complex sizing and overprovisioning requirements of network and storage configurations
- Streamlining operations and management requirements so less staff effort is needed to procure, configure, test, deploy, and manage systems
- Shortening the time to adoption of new technologies and products
- Reducing capital outlays and project risk by standardizing infrastructure components

Unified Fabric

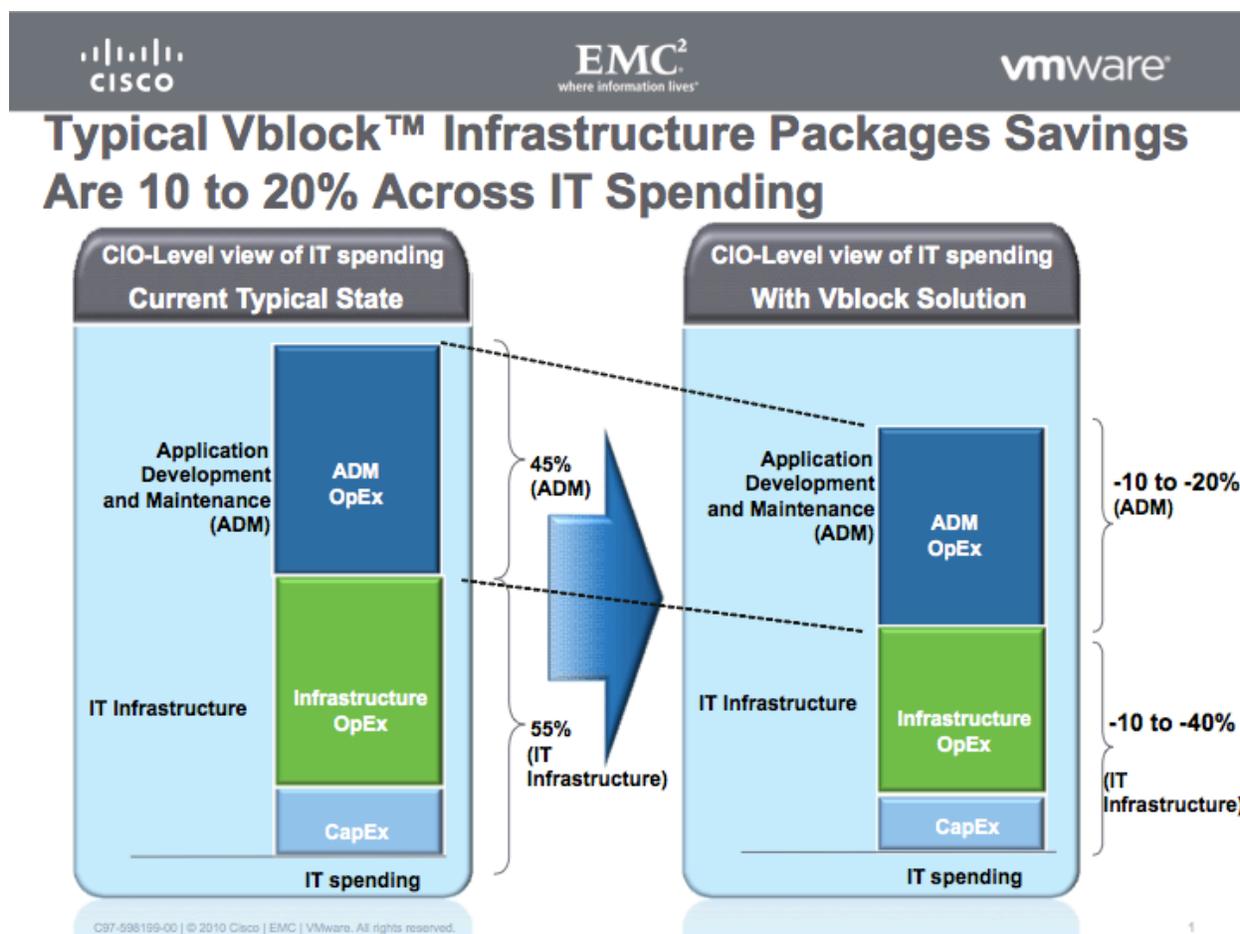
Interconnecting these standardized infrastructure packages with a single unified fabric that converges data and storage networking traffic:

- Lowers the number of ports needed on each server, storage, or network device
- Reduces the need for expensive fiber-optic cabling
- Enables a wire-once approach to I/O infrastructure

IT Budgets Before and After Private Cloud Computing

Drawing on observations of early customer implementations of preintegrated infrastructure packages and internal and industry analyst studies, the VCE coalition has developed a model of the economic benefits of transitioning to private cloud computing. Figure 2 presents a high-level summary of the findings.

Figure 2 Components of IT Cost Reduction



The left side of the figure shows a common distribution of enterprise IT cost categories. The actual proportions spent on each category differ from one enterprise to the next.



The sections on the right show the overall decrease in IT spending after the transition to private cloud computing¹. The green block estimates the operating expense cost reductions attributable to the use of preintegrated infrastructure platforms. The result is lower capital and operating expenses, including reductions in energy, cooling, and facilities costs.

The Infrastructure OpEx block identifies cost reductions attributable to improved operating efficiency achieved through the use of integrated solutions with single-pane management, including:

- Simplified management and provisioning
- Labor savings attributable to standardization on a single, virtualized x86 platform

These savings ultimately free resources with which IT can pursue innovation that creates real differentiation and value for the business.

Gain the Benefits of Private Cloud Computing Now

Implementing private cloud computing using preintegrated, tested, and validated infrastructure packages that combine best-in-class virtualization, network, computing, storage, security, and management technologies from Cisco and EMC with VMware delivers economic benefits and helps free resources to generate innovations and value for the business.

For More Information

Please contact +1 866 438 3622.

For more information, please visit [.vcecoalition](http://vcecoalition.com) to learn more about VCE and Vblock Infrastructure Packages and our extensive partner ecosystem, and to gain access to white papers and technical information.

Disclaimer

The data presented in this white paper is for illustrative purposes only. No guarantee is provided that economic benefits will be achieved in a specific customer implementation. Please see your sales representative for more information.

¹ This figure is for illustrative purposes only and is not intended to identify numerical changes in an enterprise's cost structure.



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